

WARM UP

1 Match the type of heat transmission with the pictures.

- 1  radiation
- 2  convection
- 3  conduction

## Conduction, convection and radiation

Heat is transmitted by conduction, convection and radiation.

**CONDUCTION** is the movement of heat from something hot to something colder, by direct contact, but without perceptible movement of the substances themselves. The amount of heat transferred is proportional to the difference in temperature between the two bodies, the contact surface area and the material they are made of. The effectiveness of any substance in conducting heat is called its **thermal conductivity**. Metals are good conductors; glass, plastic and ceramics are poor conductors, which can protect us from heat. In practical terms this means that a metal saucepan will heat a sauce quickly, but it needs a plastic handle to make it possible for us to touch it. Liquids and gases are fluids, which expand when they are heated. The particles in these fluids can move from place to place very quickly when hot.

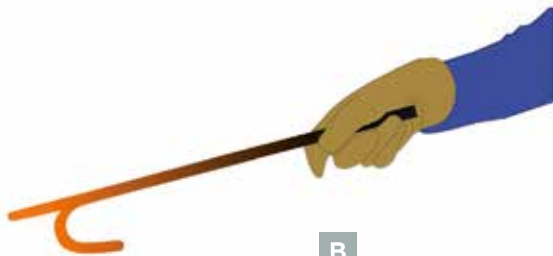
**CONVECTION** occurs when particles with a lot of heat energy in a liquid or gas move and take the place of particles with less heat energy. Heat energy is transferred from hot places to cooler places by convection. A practical example is heating water or oil in a pan to cook food.

**RADIATION** is heat carried by electromagnetic waves (infrared rays) from a hot body and absorbed by a colder body. The transmission by radiation takes place with no direct contact between the bodies and it is only possible provided that there is nothing between them that can absorb the waves. In other words heat radiation mainly takes place in a void or in the air.

For all cooking methods, apart from heat radiation, you need both a source of heat and a conductor. Conductors can be animal or vegetable fats, water or water vapour, air, metal, ceramic or pots and pans made of other materials.



A



B



C

ACTIVITIES

READING COMPREHENSION

2 Read the text about conduction, convection and radiation and complete these sentences with information from the text.

- 1 In conduction heat moves from something hot to something colder.
- 2 The difference in temperature, contact surface area and material of the bodies determines \_\_\_\_\_ by conduction.
- 3 \_\_\_\_\_ are good conductors, but \_\_\_\_\_ are poor conductors.
- 4 Liquid and gas particles can \_\_\_\_\_ quickly when hot.
- 5 In convection heat energy is transferred from \_\_\_\_\_.
- 6 Radiation is heat carried from \_\_\_\_\_ and absorbed by \_\_\_\_\_ without contact.
- 7 It can only happen when there are no obstacles between bodies to \_\_\_\_\_.
- 8 All cooking methods, apart from radiation, need both \_\_\_\_\_.

VOCABULARY

3 Read the text again and translate these words into your language.

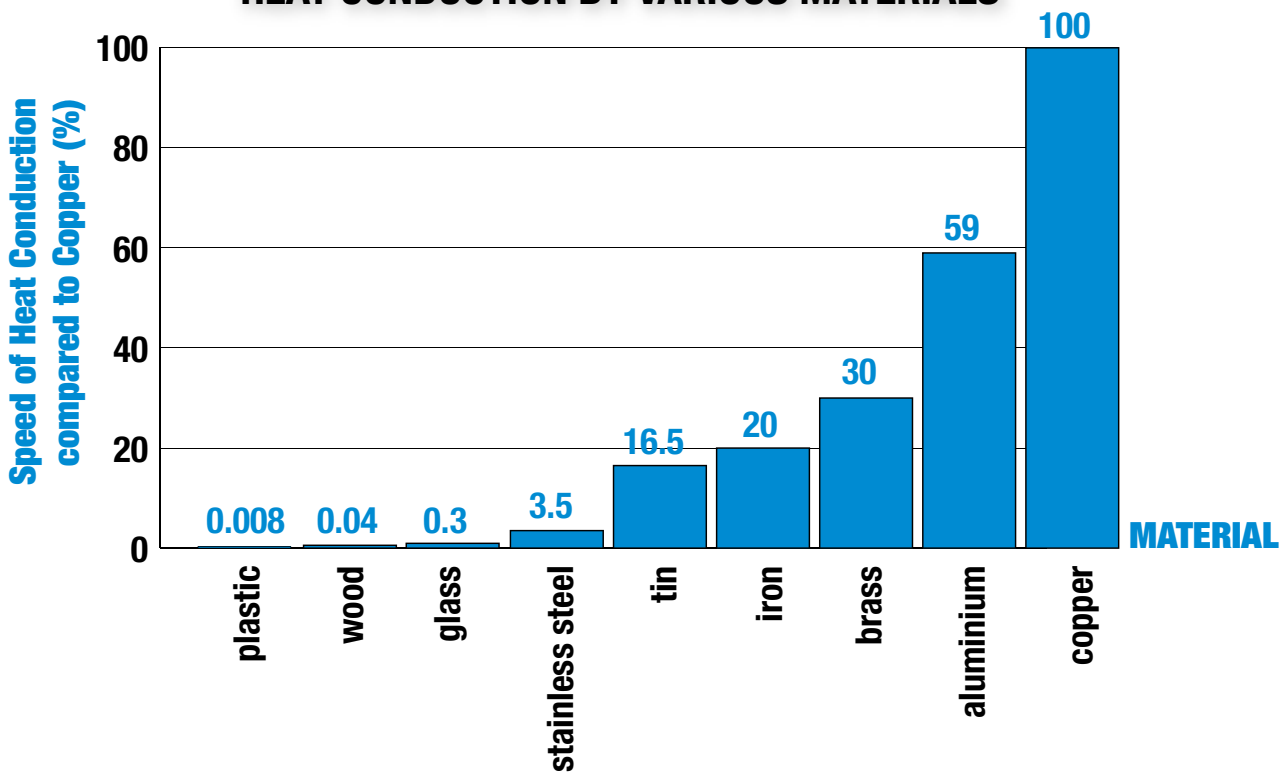
- |                   |       |                         |       |
|-------------------|-------|-------------------------|-------|
| 1 transmitted     | _____ | 6 effectiveness         | _____ |
| 2 perceptible     | _____ | 7 thermal conductivity  | _____ |
| 3 proportional to | _____ | 8 electromagnetic waves | _____ |
| 4 particles       | _____ | 9 infrared rays         | _____ |
| 5 surface area    | _____ | 10 void                 | _____ |

WRITING

4 Look at this graph showing the conductivity of different materials and write a short paragraph describing it. Use the information from the text to help you and remember to include the following information:

- a general description of the graph;
- which materials we use to heat things in the kitchen (i.e. good conductors);
- which materials we use to protect ourselves from heat (i.e. for handles, spoons, etc.);
- which materials we use to eat and drink out of (i.e. cups, plates, dishes), keeping food warm but not impossible for use to touch;
- which materials we use to eat with (cutlery).

HEAT CONDUCTION BY VARIOUS MATERIALS



From the graph we can see that ... are good conductors, whereas ... are poor conductors.

SPEAKING

5 Prepare a short presentation about heat transmission following these guidelines:

- What are the different forms of heat transmission and how do they work?
- Which materials are good conductors of heat and which are not?